



Beating Heart Headband

Written By: Becky Stern



TOOLS:

- [PanaVise \(1\)](#)
- [Scissors \(1\)](#)
- [Sewing machine \(1\)](#)
or needle & thread
- [Soldering iron \(1\)](#)
- [Wire cutter/stripper \(1\)](#)



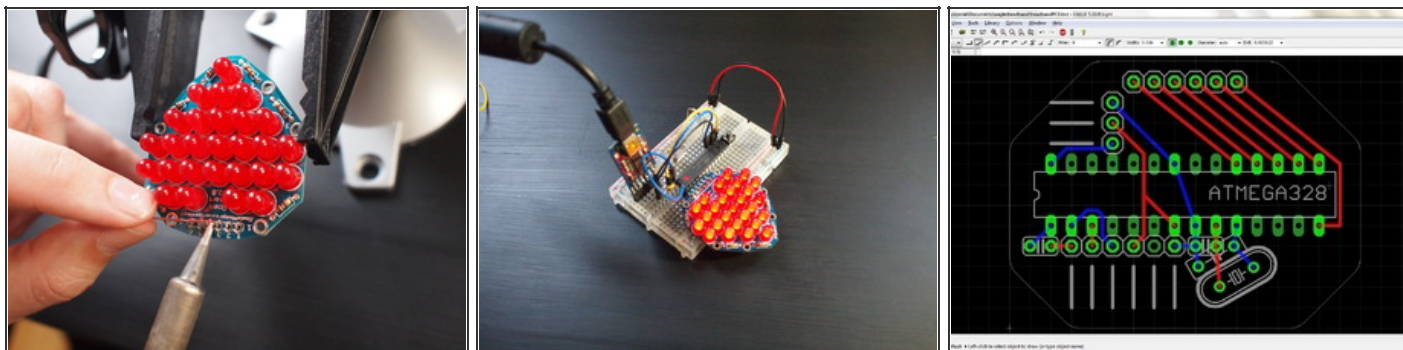
PARTS:

- [Mintronics: MintDuino \(1\)](#)
or components to build your own
- [Open Heart LED Display Kit \(1\)](#)
- [Perfboard \(1\)](#)
- [Brocade ribbon \(1\)](#)
or fabric for the headband
- [Elastic cord \(1\)](#)
- [Pulse Sensor \(1\)](#)

SUMMARY

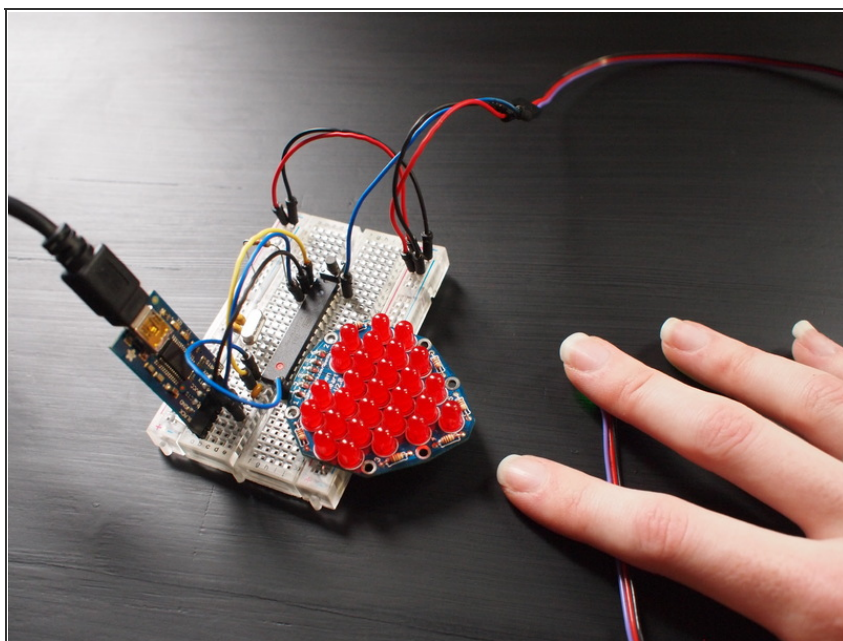
This project is a collaboration with Jimmie Rodgers. Build a pulse-sensing headband that flashes a heart-shaped LED display to the beating of your heart! Uses a scratch-built perf board Arduino built from Mintduino parts, the Open Heart LED display, Yury and Joel's pulse sensor, and a rechargeable lithium battery and power board. The circuit is built into a brocade headband with elastic at the back.

Step 3



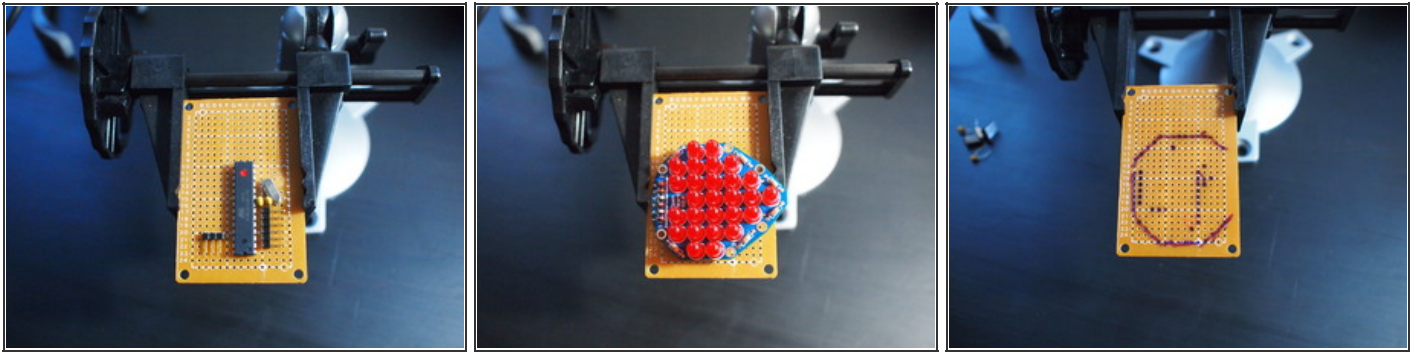
- Build the Mintduino circuit on the enclosed solderless breadboard to start out, and fire up the Open Heart test code.

Step 4



- Add the pulse sensor, load the headband's Arduino sketch onto the microcontroller, and test the sensor.
- Be sure not to pinch the connectors on the back of the sensor's circuit board, just touch the side with the heart.

Step 5



- Dry fit the components onto a piece of perfboard.
- Fit the heart display over the components, and mark the component layout with a marker.

Step 6



- Trim the circuit board to fit behind the heart display with a pair of shears.
- Double check the fit by pairing the board with the display.
- File the edges of the fiberglass perfboard to be smooth.
- Wear a dusk mask!

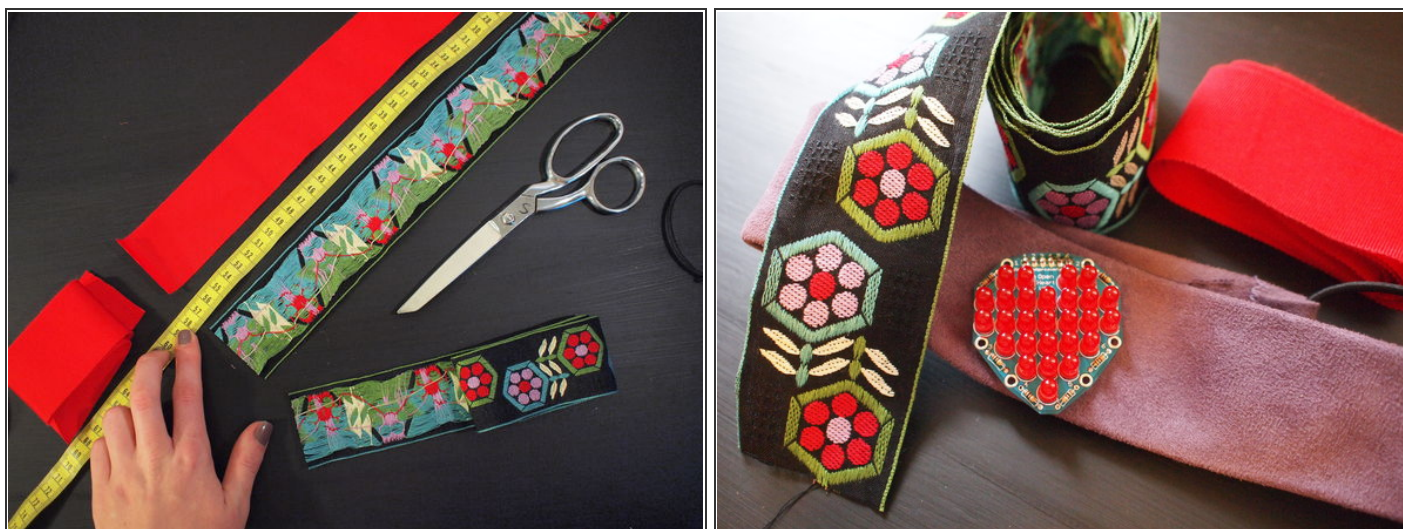


Step 7



- Solder up the components of the perfboard Arduino, using component leads and small bits of wire to make connections as necessary.

Step 8



- Headband time! Measure around the circumference of your head, then cut two pieces of ribbon to that length.
- Thanks to [Britex Fabrics](#) for supplying the beautiful brocade and grosgrain ribbon for this project!

Step 9



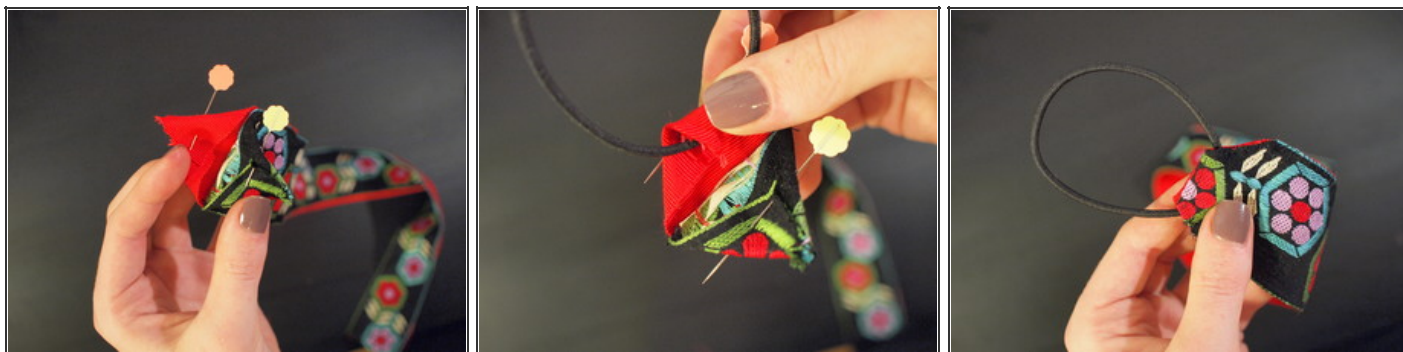
- Cut a piece of cord elastic about six inches long.
- Tie the ends together in a square knot to make a loop of elastic.

Step 10



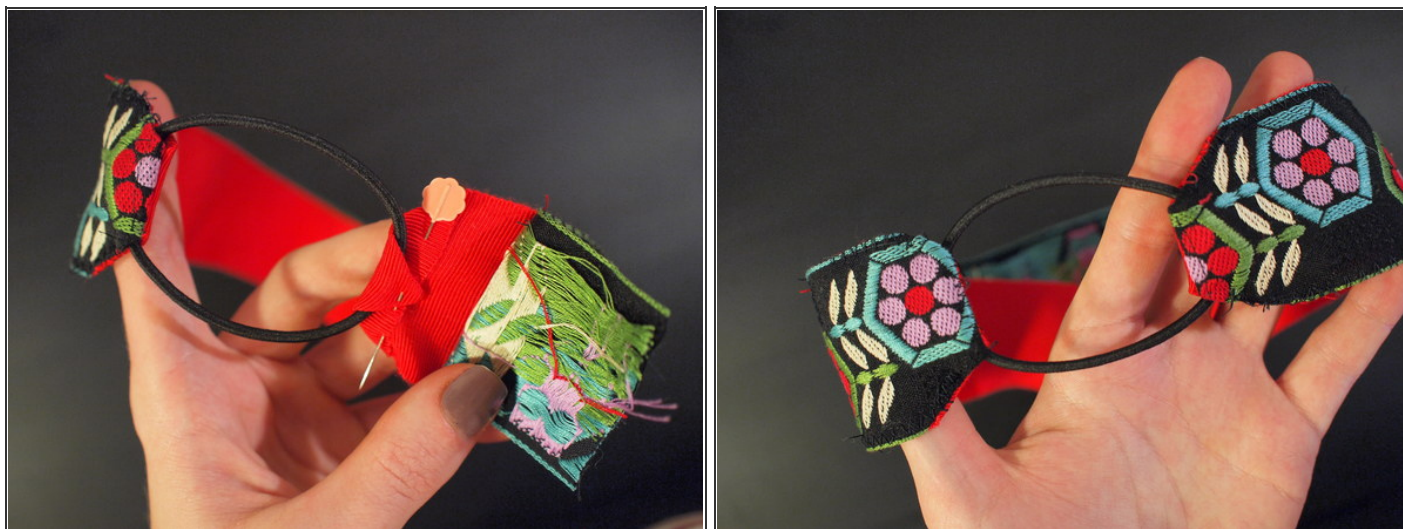
- Line up the ribbons and use a zigzag stitch along the sides, but only sew together the ends of the ribbons, leaving the middle section open as shown.

Step 11



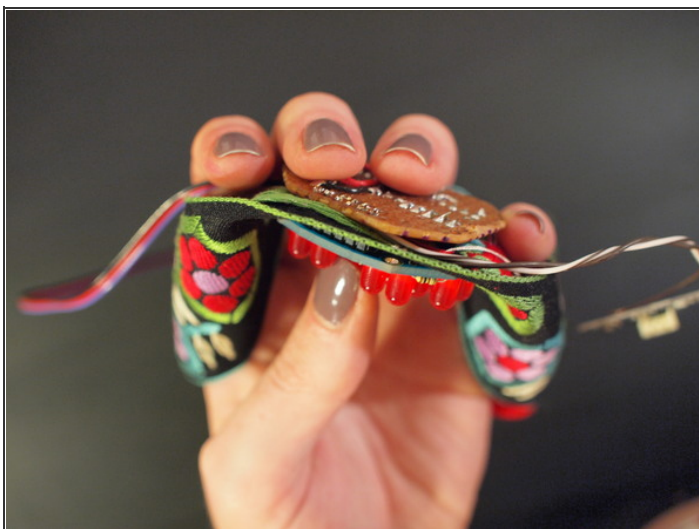
- We'll connect the ends of the ribbon with the elastic to form the headband.
- Fold and pin the ribbon ends to enclose the raw edge, and sandwich one side of the elastic loop in the fold.
- Use this seam to hide the knot in the elastic.

Step 12



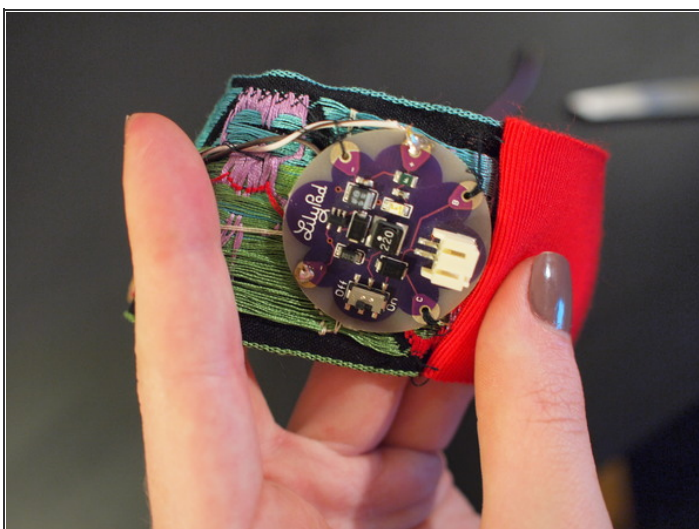
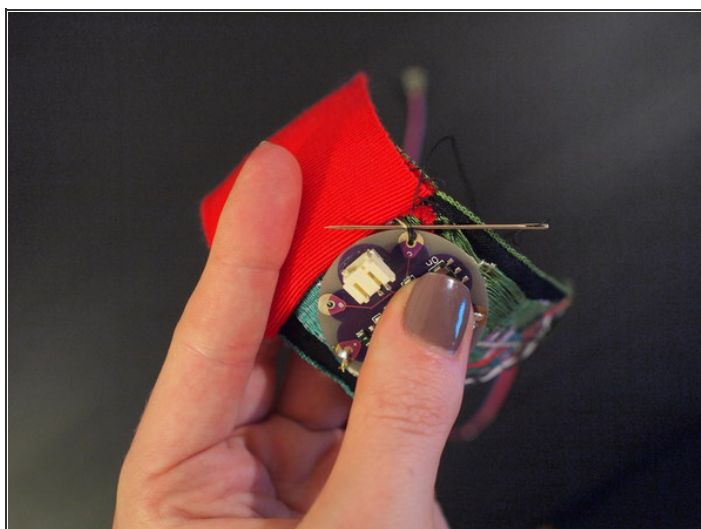
- Stitch the ribbon seam around the elastic and repeat on the other side.
- Now the headband is stretchy where it needs to be, and firm everywhere else to support the (non-stretchy) circuit!

Step 13



- Wire up the sensor and power board and lay the circuit out on the headband to decide where the display will go.
- When you find the spot you like, pierce the heart display's header pins through the outer ribbon of the headband and then through the perfboard. Solder it up.

Step 14



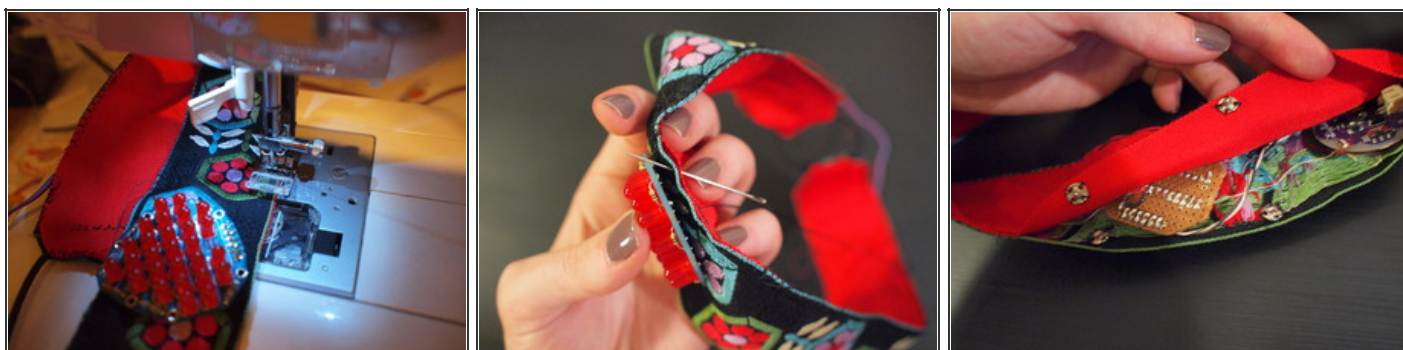
- Stitch the power board in place, keeping in mind where the tiny lithium battery will go.

Step 15



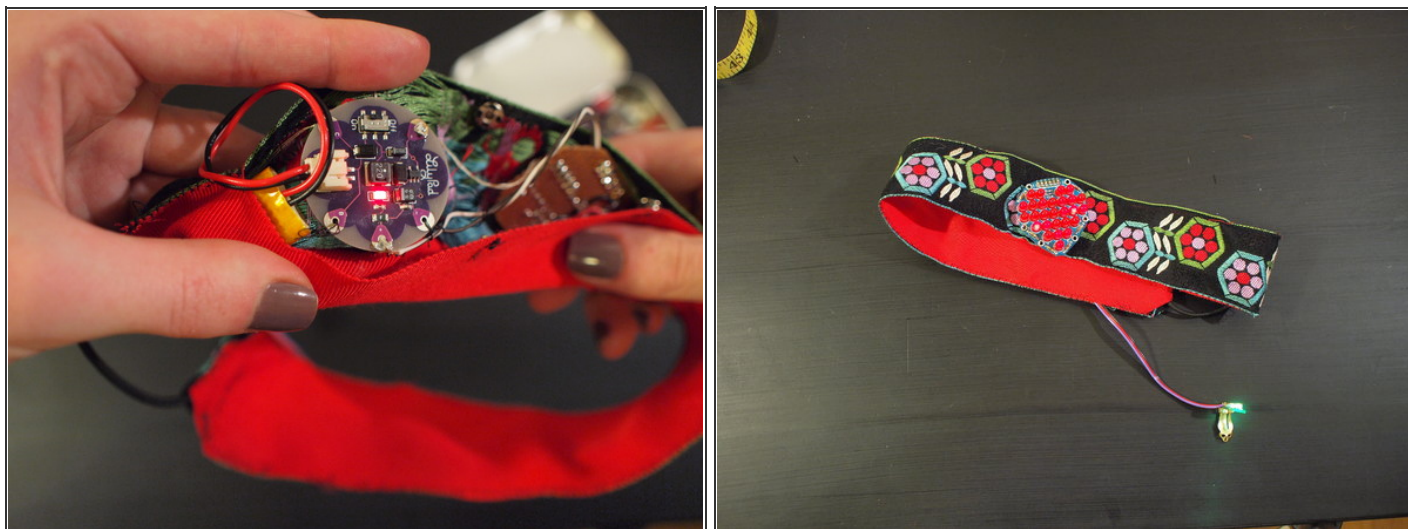
- Run the sensor out a small opening near the back of the headband, so it can loop around and clip to the ear.
- Stitch down the wires so they stay put inside the headband.

Step 16



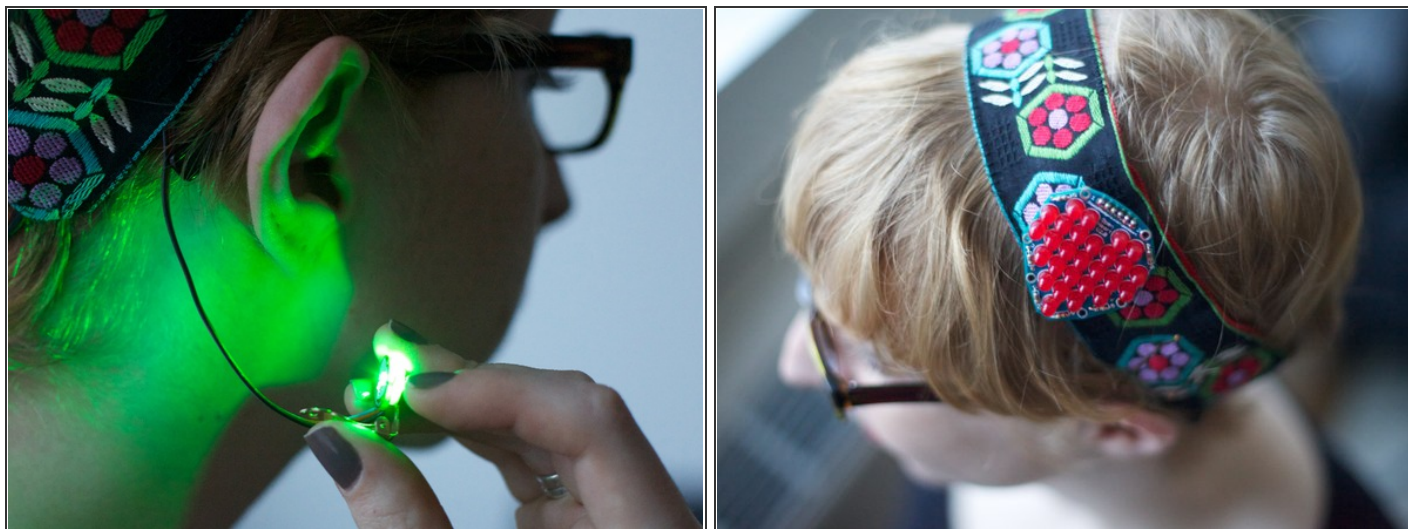
- Use a zigzag stitch to sew the headband shut along the remaining open edges.
- You may have to hand-stitch some spots too tight to get at with the sewing machine.
- Leave an opening near the power board for toggling the power and changing the battery.
- I used snaps to make a recloseable opening so I can show off the circuit.

Step 17



- Install the battery and turn it on.
- Attach the ear clip to the pulse sensor and try it on!

Step 18



- Clip the sensor to your earlobe.

Step 19



- Congratulations, you're done!

Additional photography by Matt Richardson.

This project first appeared in MAKE Volume 29.

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